

TSUNAMI NEWSLETTER



International Tsunami Information Center



Mountainside art memorial at location of landslide which killed 23 in Okushiri town.

In this issue, we focus on the tsunami warning system and research in Japan and cover the activities held at the IUGG meeting in Sapporo, including the field trip to Okushiri Island. The field trip corresponded with the 10-year anniversary of the Hokkaido Nansei Oki earthquake tsunami of July 12, 1993.



An emotional tribute delivered by a young lady at the 10th anniversary ceremony mourning the 198 people who died in the 1993 Okushiri earthquake and tsunami.

SUMMARY OF EARTHQUAKES IN THE PACIFIC Occurring June-July 2003

With surface wave or moment magnitude (M_w) greater than or equal to 6.5 and a depth no greater than 100 km, or an event for which a Tsunami Information Bulletin (TIB) or Regional Watch Warning (RWW) was issued. Epicenter and M_w from USGS National Earthquake Information Center (NEIC, G); preliminary M_s from PTWC (P) at time of action; M_w and depth from Harvard (H).

DATE	TIME (UTC)	LOCATION	LAT	LONG	DEPTH (km)	M_w	M_s	PTWC ACTION	ACTION TIME (UTC)	Damaging Tsunami ?
6 June	0:33	New Britain Region, PNG	5.100 S	152.342 E	34	6.5 (H) 6.4 (G)	6.7 (H) 6.8 (G) 6.8 (P)	TIB	1:04	NO
15 June	19:25	Rat Islands, Aleutian Islands	51.663 N	176.827 E	28	6.5 (H) 6.3 (G)	6.6 (P)	TIB	19:37	NO
20 June	13:31	Chile-Argentina Border	30.532 S	71.371 W	34	6.8 (H) 6.7 (G)	6.9 (H) 6.8 (G) 6.6 (P)	TIB	13:53	NO
23 June	12:13	Rat Islands, Aleutian Islands	51.421 N	176.794 E	28	6.9 (H) 6.8 (G) 7.1 (P)	6.9 (H) 7.0 (G)	TIB	12:25	NO

JAPAN'S EPOS EARTHQUAKE AND TSUNAMI WARNING SYSTEM

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The Japan Meteorological Agency (JMA), as a governmental organization of Japan, is responsible for issuing information on tsunamis and earthquakes. The information issued by JMA is transmitted to the broadcasting media and various sections for disaster mitigation and is used as criteria for initiating emergency response operations. JMA began its tsunami forecast and information services in 1952 for local tsunamis and expanded its services to distant tsunamis in 1962 in cooperation with the Richard H. Hagemeyer Pacific Tsunami Warning Center (PTWC) and the related agencies of the neighboring countries. In 2001, JMA began providing tsunami forecasts in the Japan Sea to overseas authorities.

Quantitative Tsunami Forecast System

JMA introduced its Quantitative Tsunami Forecast System in 1999. The System utilizes a very large database of tsunami maximum heights and arrival times calculated for a variety of hypocenters, magnitudes, and fault models (Fig.1). Altogether, about 100,000 local tsunamis and about 100 distant tsunami scenarios were numerically simulated and stored in the database. When an earthquake occurs, JMA immediately determines its hypocenter and magnitude. If these values exceed the criteria set up in

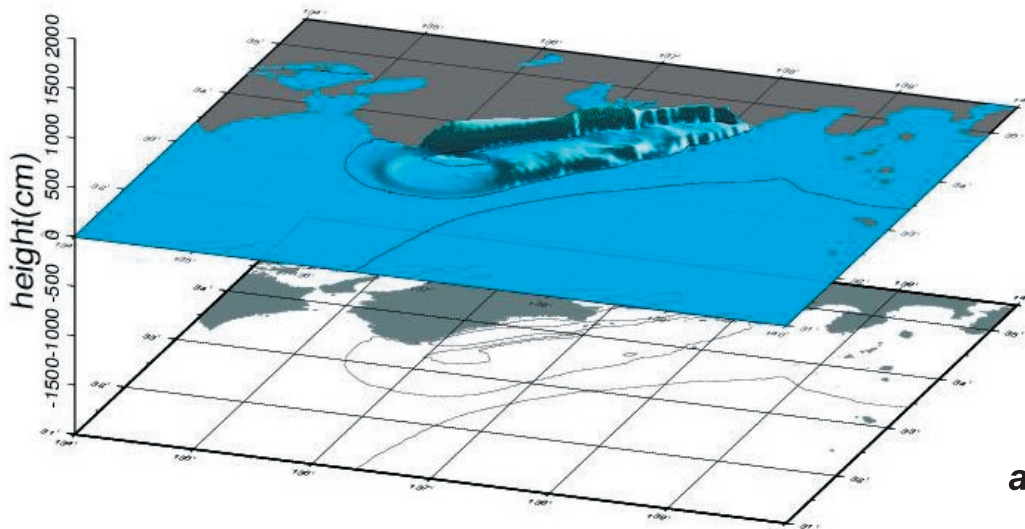
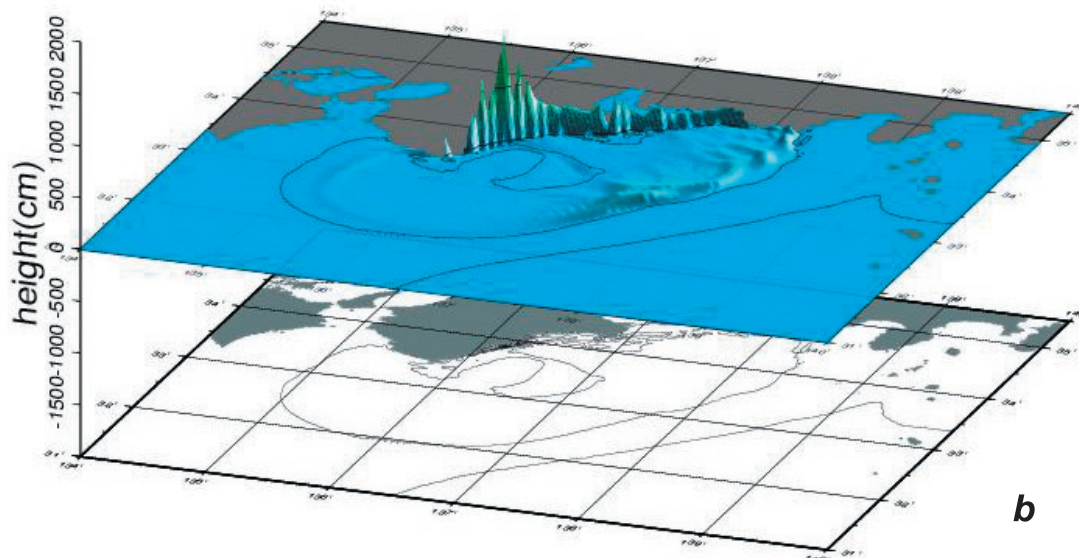


Figure 1. Example of a tsunami simulation: a) 1944 Tonankai Earthquake 5 minutes after the earthquake. b) 1944 Tonankai Earthquake 10 minutes after the earthquake.



JAPAN’S EPOS, *continued*

advance, the Quantitative Tsunami Forecast System retrieves estimated maximum heights and arrival times of tsunami from the database using the hypocenter and the magnitude as the index. If the result reveals a high probability that a tsunami will be generated and will strike coastal areas with an estimated height of more than 20 cm, tsunami bulletins are created and issued. If the result indicates that there is little possibility of damage (the estimated height is less than 20 cm), or that a tsunami will not be generated, JMA issues the message “the possibility of slight sea level change” or “no tsunami is expected” on its earthquake information bulletin.

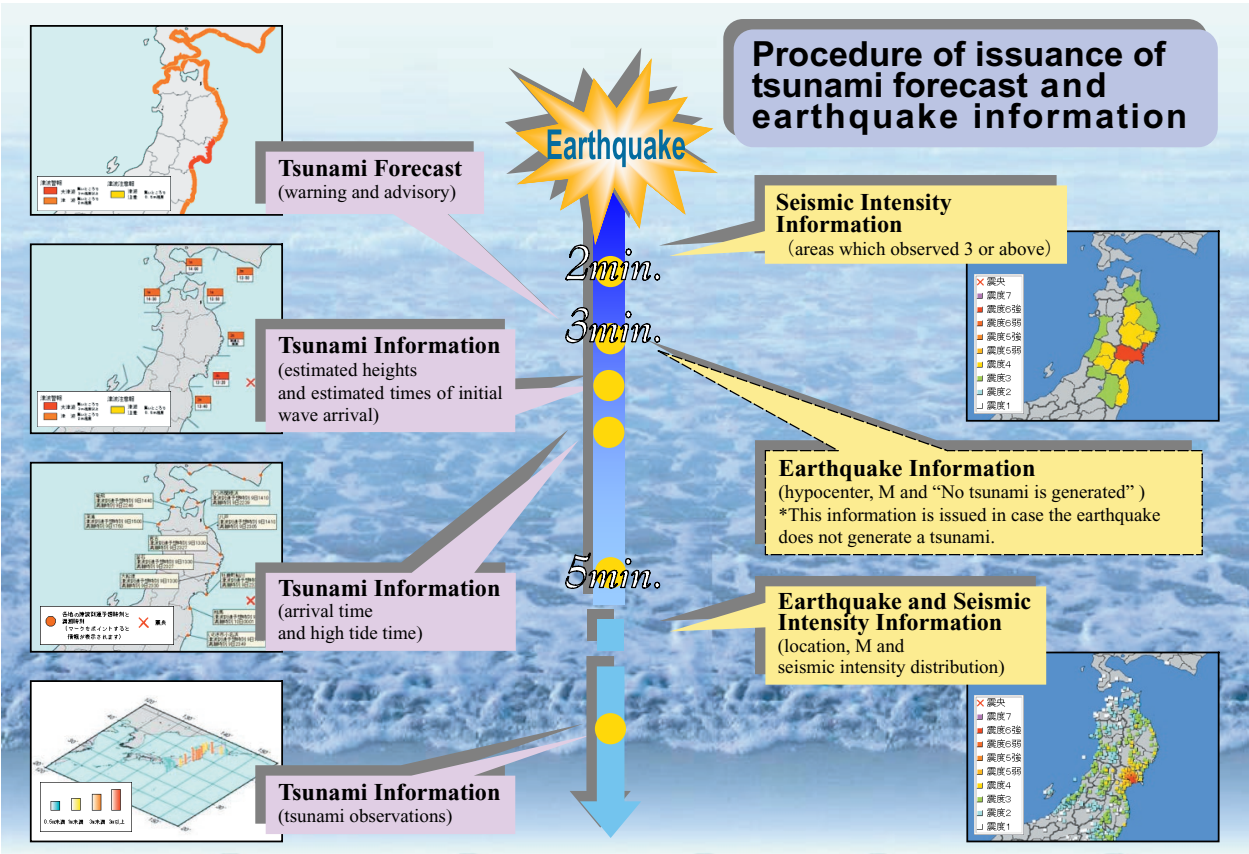


Figure 2. Procedure of issuance of tsunami forecast and earthquake information.

Tsunami Forecast		Value of Tsunami Height to be issued
Tsunami Warning	Major tsunami	“3m”, “4m”, “6m”, “8m”, “over 10m”
	Tsunami	“1m”, “2m”
Tsunami Advisory	Tsunami attention	“0.5m”

Figure 3. Types of tsunami forecast.

case, JMA judges whether a tsunami has been generated using its Quantitative Tsunami Forecast System. If a tsunami is expected, the tsunami forecast is issued about three minutes after the earthquake (Fig. 2). JMA issues a two-level Tsunami Warning and the Tsunami Advisory (Fig.3), and its Tsunami Forecast Bulletin for 66 individual regions around Japan (Fig.4). Estimated heights, arrival times and high tide times at main coastal points where tide stations are operated are contained in the bulletin. There are 103 tide stations throughout Japan. When tsunamis are observed at the stations, the observed values are

Tsunami Forecast Procedures

JMA monitors seismic activity around Japan and receives information from PTWC and the U. S. Geological Survey on distant earthquakes 24 hours-per-day. When an earthquake occurs around Japan, JMA immediately determines its hypocenter and magnitude using its own system. When a distant earthquake occurs, JMA determines approximately the hypocenter and magnitude using its system, and also receives information from PTWC and USGS. In either

JAPAN'S EPOS, *continued*

issued as part of the tsunami information. The tsunami warning and/or advisories are cancelled when the observed tsunami heights become lower and less than 20cm.

Tsunami forecasts and information issued by JMA are transmitted not only to the proper agencies and the public in Japan, but also to the PTWC and the appropriate agencies of neighboring countries. When there is a possibility that tsunami waves will impact the Japan Sea coast, JMA will provide tsunami forecasts to overseas authorities (Fig.5) using its Quantitative Tsunami Forecast System.

Upgrading of EPOS (Earthquake Phenomena Observation System)

EPOS is the JMA's integrated processing system for earthquakes and tsunamis. It consists of an on-line switching system for seismic bulletins, and a platform providing for urgent operations, and review and analysis of the event. All seismic and tsunami observation data are archived by EPOS. When an earthquake occurs, its hypocenter and magnitude are determined automatically or manually on EPOS, and the information

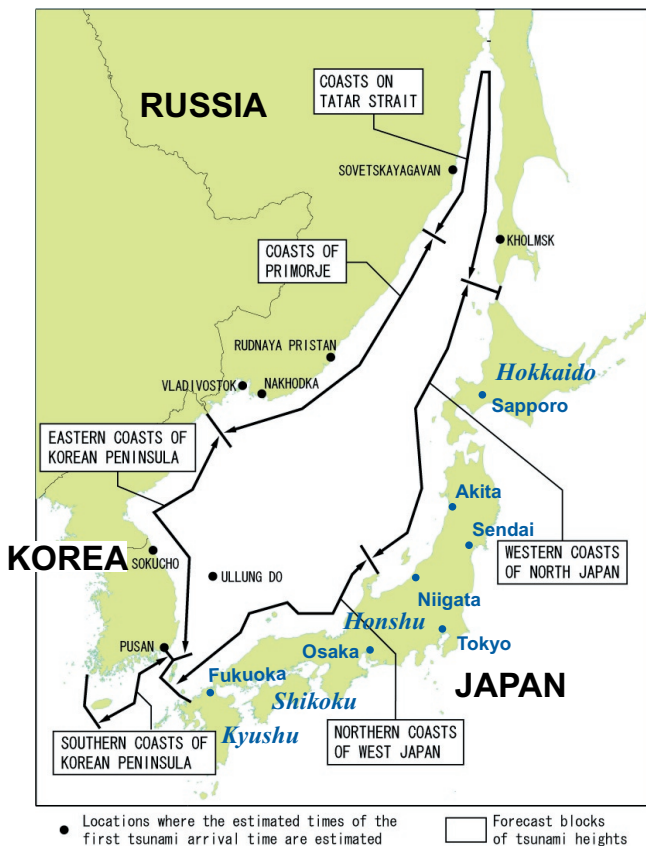


Figure 5. Tsunami forecast blocks (Japan Sea).

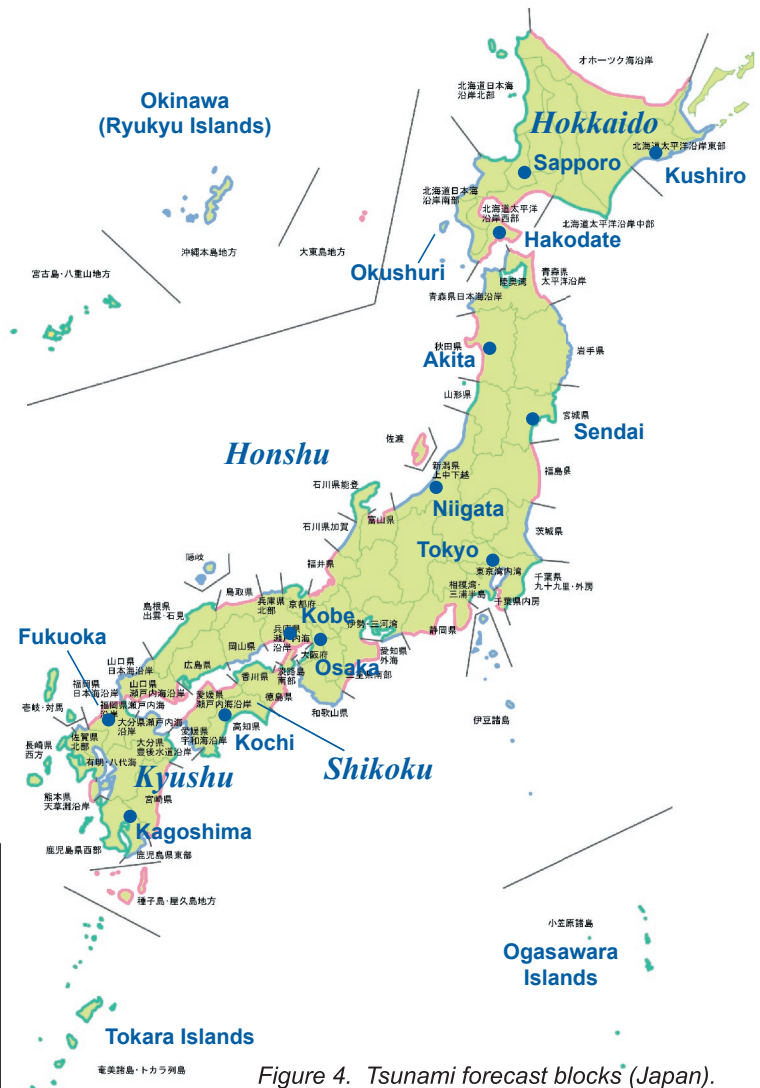


Figure 4. Tsunami forecast blocks (Japan).

sent to the Quantitative Tsunami Forecast System which then begins to retrieve the tsunami evaluation data from the database.

JMA will be upgrading EPOS in October, 2003. The upgraded EPOS will have more memory and will result in faster processing speeds. It is expected that the tsunami forecast procedure will lead to a more prompt and precise response after the occurrence of an earthquake. The upgraded EPOS will also implement a new function called Nowcast Earthquake Information that will be capable of providing early warning information. The information will include the earthquake's hypocenter, estimated seismic arrival times, and expected seismic intensity, and will be issued immediately after a large earthquake occurs and before seismic waves arrive at more distant stations. JMA has

JAPAN'S EPOS, *continued*

developed a technique for quick hypocenter and magnitude determination using waveform data from seismograph stations near the focus, and installed new types of seismographs around Japan that will be able to provide this information. The information bulletins will be disseminated to selected organizations initially for testing prior to implementing it into its full operations. It is hoped that this or a similar technique can be applied to tsunami forecasts in the future. Currently, the upgraded EPOS is undergoing a trial operational period and JMA staff are being trained with the goal of starting formal operations on 1 October 2003 (Figure 6).



Figure 6. JMA Staff training for upgraded EPOS system.



On July 7, 2003 prior to the IUGG Meeting, Dr. Chip McCreery (PTWC Geophysicist-in-Charge) and Dr. Laura Kong (ITIC Director) visited JMA headquarters in Tokyo. They met with Mr. Noritake Nishide, Director of the Earthquake and Tsunami Observations Division, and some of his staff to discuss a variety of issues relevant to the Tsunami Warning System in the Pacific, including PTWC's new procedures and criteria for warnings, and JMA's experiences as a newly established regional warning center for events in the Sea of Japan. Mr. Nishide provided an interesting and informative tour of JMA's operations center for handling earthquake, volcano, and tsunami events. Shown to the left are Dr. McCreery (right), Mr. Nishide (center), and Mr. Mikio Fujii (left, Tsunami Research Division Director)

CURRENT RESEARCH IN JAPAN

Paleo-tsunami Studies Renews Knowledge on Earthquake Recurrences

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The study of paleo-tsunamis has become popular throughout the world in the last decade or so. In Japan, tsunami deposits from the past 7000 years in eastern Hokkaido reveal that the southern Kuril trench has repeatedly produced earthquakes and tsunamis larger than those recorded in the region's 200 years of written history (Nanayama et al., 2003). Eastern Hokkaido's historical record includes tsunamis from an earthquake that ruptured 200 km of plate boundary in 1952 (Mw 8.1 Tokachi-oki), and from an adjoining rupture 100-km long in 1973 (Mw 7.8 Nemuro-oki). Maximum run-up heights rarely exceeded 4 m. These events, and similar ones in 1843 and 1894, have been considered characteristic of the southern Kuril trench. Deposits of larger, prehistoric tsunamis underlie lowlands and lagoons along 200 km of eastern Hokkaido's Pacific coast. At Kiritappu, for instance, sand sheets extend as much as 3 km inland across a beach-ridge plain, ten times farther than the historical tsunami deposits. Volcanic ash layers aid in correlation and dating. Extensive tsunami deposits from the past 3000 years at Kiritappu, and from the past 7000 years at nearby Harutori-ko lagoon, imply an average recurrence interval of about 500 years. The most recent of the unusually-large tsunamis occurred about 350 years ago. In numerical simulations, the geologically-inferred tsunamis are best explained by plate-boundary ruptures 300 km long with 5 m of slip (Mw 8.4). Shorter ruptures from smaller earthquakes, like those in 1952 and 1973, produce simulated inundations that are less extensive than the sand sheets. Tsunami earthquakes from ruptures 50-km wide, near the trench axis, also fail to produce extensive inundation, because their tsunamis have narrow wavelengths.

(Summarized from: Nanayama, F., Satake, K., Furukawa, R., Shimokawa, K., Atwater, B.F., Shigeno, K. and S. Yamaki, 2003, Unusually large earthquakes inferred from tsunami deposits along the Kuril trench, *Nature*, 424, August 7, pp. 660-663).

TWENTY-FIRST INTERNATIONAL TSUNAMI SYMPOSIUM

Dr. Kenji Satake, IUGG-Tsunami Commission Chair, Active Fault Research Center, GSJ/AIST (National Institute of Advanced Industrial Science and Technology), Site C7 1-1-1 Higashi, Tsukuba 305-8567 Japan, kenji.satake@aist.go.jp

The 21st international tsunami symposium was held on July 9 and 10th, as a part of International Union of Geodesy and Geophysics (IUGG) general assembly in Sapporo, Japan. For the 2003 symposium, 87 papers were submitted, of which 34 (~40%) were from Japan. Because of time limitations (2 days), 50 papers were scheduled for oral presentations and the remaining were presented as posters. About 60-70 people were always present during the oral sessions. The papers covered several categories. Case studies of recent or historical tsunamis (~15 papers) included reports on the recent tsunami in Stromboli Island (December 2002) and the Historical Tsunami Data Base developed in the United States, Russia and New Zealand. Geological investigations of tsunami deposits have become more numerous in the last decade, and reports were given on studies in Japan, Russia and Europe (~10 papers). Tsunami generation and propagation papers were presented on theory, and physical and numerical experiments (~20 papers). One of the hot topics in this field today is generation mechanism of landslide-generated tsunamis and its discrimination from earthquake-generated tsunamis. New instrumentation and tsunami observation investigations (~7 papers) included reports on the use of GPS, Earth Observing Satellites, Ocean Bottom Pressure Gauge and Ionosphere Observation methods. Nearly 20 papers dealt with mitigation and the reduction of tsunami hazards and tsunami warning systems. At the IUGG-Tsunami Commission business meeting held on July 9th, it was decided that the proceedings of the symposium, consisting of about 20 selected papers, will be published.

IUGG TSUNAMI COMMISSION BUSINESS MEETING

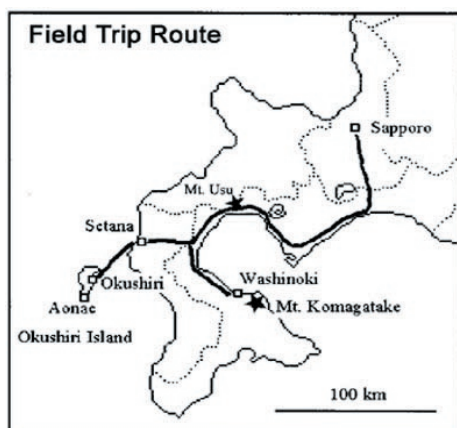
Dr. Viacheslav K. Gusiakov, Outgoing Chair, IUGG, Tsunami Commission; Tsunami Laboratory, Institute of Computational Mathematics and Mathematical Geophysics, Siberian Division, Russian Academy of Sciences, Pr. Lavrentieva, 6, Novosibirsk 630090 Russia, gvk@omzg.sccc.ru

The IUGG - Tsunami Commission business meeting was held on July 10, 2003, from 19:00 to 20:30 at the Royton Hotel, Sapporo, Japan, after the completion of the IUGG Tsunami Symposium JSS07. The meeting was attended by the following Commission members: K. Abe, E. Bernard, F. Camfield, F. Gonzalez, V. Gusiakov, F. Imamura, S.-I. Iwasaki, B. Levin, A. Marchuk, Y. Nishimura, E. Okal, E. Pelinovsky, K. Satake, S. Tinti, Y. Tsuji, and A. Yalciner. The 2003 meeting agenda included the following items: (1) Chairman's report on the activities of the Commission in 2001-2003, (2) Progress reports on the IUGG-TC sponsored projects (HTDB/PAC, TIME), (3) Publication of Proceedings of the Sapporo Symposium, (4) Tsunamis from Asteroid/Comets Impact (report on Dr. Gusiakov's participation in the ICSU-sponsored meeting on Asteroid/Comet Hazard for the Society), (5) Selection of the site of the 2005 Tsunami Symposium, (6) Election of new Commission members, (7) Election of new Commission officers. The full text of the Commission report can be found at <http://omzg.sccc.ru/tsulab/IUGGTCrep2003.html>.

Following a tradition of the Tsunami Commission, it was decided to publish the 2003 IUGG Tsunami Symposium proceedings as a volume of the selected papers in the Kluwer's series "Advances in Natural and Technological Hazards Research" with Kenji Satake as the Chief Editor. The tentative deadline for manuscript presentation is December 1, 2003, with expected publication of the proceedings by the end of 2004. For the 2005 meeting site, it was decided to accept the kind proposal made by G. Papadopoulos to host the next biannual Tsunami Research Symposium in the end of June of 2005 in Greece on the island of Crete. Taking advantage of the next IASPEI General Assembly to be held October 2 to 8, 2005 in Santiago, Chile in close proximity in time with the XX ITSU Session planned in Valparaiso, Chile, it was proposed to hold a Tsunami Workshop within the Assembly program. The particular subject of this workshop will be determined after discussion with the ICG/ITSU. Two Commission members, R. Braddock (Australia) and H. Miyoshi (Japan), who missed three consecutive meetings (in 1999, 2001 and 2003), were deleted from the membership. J. Lander (USA) was deleted as retired from tsunami business. Instead, two new Commission members, V. Titov (USA) and G. Downes (New Zealand) were elected. Finally, new Commission Officers were elected – K. Satake (Japan) as Chair, Frank Gonzalez (USA) and G. Papadopoulos (as Vice-Chairs) and F. Imamura (Japan) as Secretary. On behalf of the Commission members, E. Bernard expressed sincere thanks and appreciation to the retired officer team (V. Gusiakov, S. Tinti, J. Lander) for their outstanding service during the last eight years.

IUGG FIELD TRIP

Tsunami Deposits, Damage and Reconstruction on Okushiri Island, Japan



Field trip leaders: Dr. Yuichi Nishimura, Institute of Seismology and Volcanology, Hokkaido University, Kita 10, Nishi 8, Kita-ku, Sapporo 060-0810, Japan, nishi@eos.hokudai.ac.jp; Dr. Fumihiko Imamura, Disaster Control Research Center, Graduate School of Engineering, Tohoku University, Aoba 06, Sendai 980-8579, imamura@tsunami2.civil.tohoku.ac.jp, and Dr. Kenji Satake, GSJ/AIST (National Institute of Advanced Industrial Science and Technology), Site C7 1-1-1 Higashi, Tsukuba 305-8567 Japan, kenji.satake@aist.go.jp

After the IUGG conference, thirty-three people (eight from U.S.A., one from Russia, New Zealand and Korea, and 22 from Japan) participated in the July 11-13, 2003, field trip to Okushiri Island. The trip coincided with the 10th anniversary of the July 12, 1993, southwest Hokkaido earthquake, that caused devastating damage on the island. The informative trip examined and visited the reconstruction of the town and countermeasures that were put in place to mitigate against future tsunamis.

Day 1 (July 11): The bus left Sapporo in the morning for Usu Volcano, located 70 km southwest of Sapporo. On March 31, 2000, phreatomagmatic eruptions started at the northwestern foot of the volcano after 22 years of dormancy. The eruption continued for several months, and more than 60 new craters and a new cryptodome were formed at the northwestern foot of the volcano. Route 230 was completely destroyed by graben-forming normal faulting and ground uplift 60-75 m in height. The newly constructed Sabo dams on Route 230 now protect the town from mud flows. In the Nishiyama crater area, where houses were damaged by numerous graben-forming normal faults, fumarolic activity still continues. Following the Usu visit, a ferry boat was taken to the eastern side of Okushiri Island. During the 1993 earthquake, a large landslide occurred on



Damage caused by uplift and normal faulting during the 2000 Usu volcano eruption in the Nishiyama crater area.



Field trip participants at entrance to Tsuji Valley, Monai district, where the highest run-up (31.7 m) on Okushiri island was measured.

IUGG FIELD TRIP, *continued*

the steep flank of Kan-non-san near the harbor, completely destroying Hotel Yoyo-so and killing 23 tourists. A briefing was given by Hokkaido prefecture staff summarizing the island's disaster and reconstruction project. On Okushiri island, participants stayed at a hotel on the western side of the island, where they enjoyed local seafood and the hot spring.

Day 2 (July 12): The Monai district, located on the western side and facing the southern end of the 1993 earthquake source area, recorded the highest tsunami run-up at 31.7 m in a narrow valley (Tsuji valley). As one of the most challenging problems of the Okushiri tsunami has been to simulate the Monai run-up, the field trip provided a good opportunity for scientists to discuss recent advancements in tsunami modeling.



Gaye Downes (left, newly elected IUGG Tsunami Commission member) discusses tsunami reconstruction with Dr. Imamura (center). The obelisk (tall monument) seen in the background was the only structure left standing at the southern end of Aonae after the tsunami.

and younger sister who perished in the tsunami.

In the evening, a tsunami symposium organized by the local government and also held as an IUGG outreach activity was attended by approximately 100 people, including the Hokkaido prefectural governor and the Okushiri town mayor. Drs. Yuichiro Tanioka, Fumihiko Imamura and Eddie Bernard gave talks entitled "Earthquakes and Volcanoes in Hokkaido", "Damage



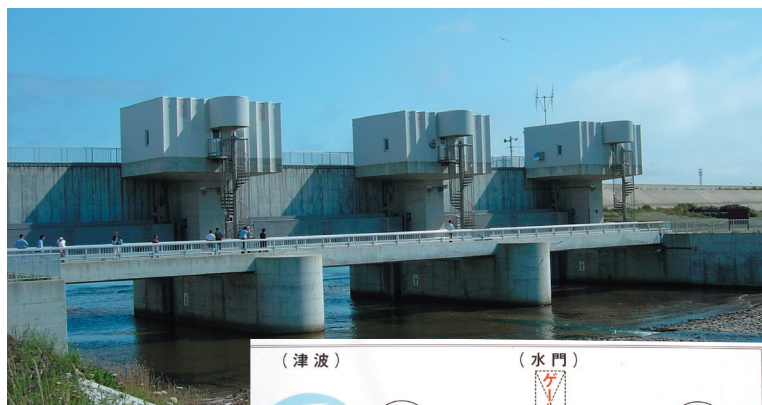
Drs. Yoshiaki Tanioka (left), Kenji Satake (middle), and Yoshinobu Tsuji (right) at Sabo dam.

The Aonae district at the south end of the island was completely destroyed by the 1993 tsunami and fire, especially the southernmost point where all construction was swept away; only a symbolic tower was left standing at the tip. After reconstruction, this area was converted to a memorial park, and in 2001, a tsunami memorial hall and memorial were dedicated. The museum displays the history, nature, and culture of Okushiri Island, and the impacts of the 1993 earthquake and tsunami, through photographs and movies. In Aonae district, many types of countermeasures were constructed, including an artificial high place near Aonae harbor; the platform is about 10-m high and will enable people working in the harbor to easily and quickly evacuate to higher ground before the tsunami arrives. New evacuation routes to higher ground were constructed by traveling up a gentle slope, rather than by stairs, and with an arching roof to protect the route from winter snows. Four tsunami-protection water gates were built on the island, including one at Aonae river that automatically closes after the one minute alert announcement of a large earthquake (intensity greater than IV on the JMA scale), or upon announcement of an official tsunami warning by JMA. In the Hamatsumae and Inaho districts, long concrete embankments or sea walls were constructed to protect the reconstructed roads and houses.

Participants attended the 10th mourning ceremony for the 1993 disaster organized by local government of Okushiri town. About 600 people, including bereaved family members, the governor of Hokkaido Prefecture, and members of the National Diet attended. After reading aloud the names of the 198 victims on Okushiri island, attendees offered flowers in their memory. The ceremony included an emotional tribute by a young lady to her father



Ten-meter high platform built at Aonae Harbor as tsunami countermeasure to enable fisherman to evacuate to high ground quickly.

IUGG FIELD TRIP, *continued*

Water gate constructed at Aonae River. The gate automatically closes immediately after a large earthquake or upon the issuance of a tsunami warning. In the event of tsunami, the sign warns of the danger of being on the ocean-side of the closed



vertical outcrop contains a sand and gravel layer that is overlain by a thick tephra layer (Ko-d, 1640 Komagatake tephra). Mean grain size of the deposit tends to decrease with distance from the sea. Since the tsunami deposit overlays the first blast deposits from the Komagatake volcano, it is inferred that the tsunami occurred during the first stage of the eruption and was associated with the sector collapse of the volcano. The final destination of the field trip was Kun-nui harbor. This harbor was constructed offshore and connected by a bridge. It was designed to reduce the effects of littoral drift by coastal currents.

Caused by the 1993 Hokkaido SW Tsunami at Okushiri and Its Lessons" and "How the Okushiri Tsunami Influenced the Development of Tsunami Mitigation Activities in the U.S.", respectively. Questions and discussion with the audience afterwards showed the town's high awareness of tsunami disasters and mitigation countermeasures.

Day 3 (July 13): After leaving the island on the first ferryboat of the morning, we visited Washinoki, Mori town, where paleo-tsunami deposits can be clearly observed. The deposit is thought to result from the 1640 Hokkaido Komagatake eruption. Because of significant tephra fall from the volcano, the original sedimentological features of the tsunami deposit are well-preserved. The 4-m high



Dr. Nishimura (right) and field trip participant Tamie Jovanelly (center) examining tsunami deposits from the 1640 Komagatake eruption tsunami at Washinoki, Hokkaido.

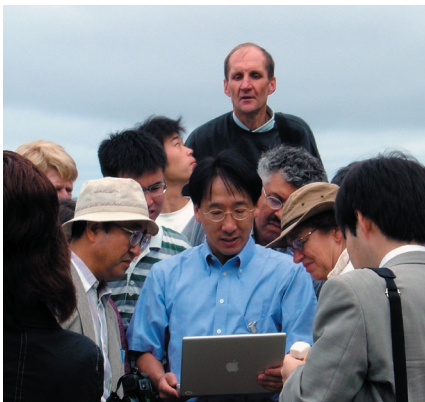
NGDC/HTDB MEETING ON THE HISTORICAL TSUNAMI DATABASE PROPOSAL

Dr. Viacheslav K. Gusiakov, HTDB-Pacific Project Coordinator; Tsunami Laboratory, Institute of Computational Mathematics and Mathematical Geophysics, Siberian Division, Russian Academy of Sciences, Pr. Lavrentieva, 6, Novosibirsk 630090 Russia, gvk@omzg.sssc.ru.

The U.S. National Geophysical Data Center/World Data Center for Solid Earth Geophysics (NGDC/SEG) and the Novosibirsk Tsunami Laboratory/Institute of Computational Mathematics and Mathematical Geophysics (NTL) have developed a plan with the International Tsunami Information Centre (ITIC) to compile a unified and comprehensive Global Historical Tsunami Database (GHTD) that will be built by merging the two existing tsunami databases (Worldwide Tsunami Database of the NGDC and the Historical Tsunami Database (HTDB) of the NTL) with the further input from the HTDB Regional Coordinators for the Pacific on the historical data locally and regionally available. This proposal was developed extensively during June, 2003, by Paula Dunbar (NGDC Natural Hazards Program Manager), Laura Kong (ITIC Director), Viacheslav Gusiakov (HTDB Project Coordinator), and Eddie Bernard (NOAA Pacific Marine Environmental Laboratory Director). The first NGDC/HTDB working meeting was held on July 8, 2003 in Sapporo, Japan, before the IUGG Tsunami Symposium. The meeting was attended by P. Dunbar, L. Kong, V. Gusiakov, Chip McCreery, PTWC Director, L. Dengler, HEED Director, California, USA, K. Satake, IUGG/TC Chair, and G. Downes, IGNS Ltd., New Zealand. In the course of extensive debate, the general plan, time schedule and list of actions required were discussed and possible sources of funding for GHTD project implementation were outlined.

DATABASE PROPOSAL, *continued*

It was decided to define a new database format that will include information from both databases. This new format will be developed jointly by Dunbar and Gusiakov by the end of this September for further discussion during the International Tsunami Workshop and XIX ICG/ITSU Session in Wellington, New Zealand. During the rest of 2003, the current content of both databases will be revised based on the printed tsunami catalogs and other widely available publications. Then, in the first quarter of 2004, both databases will be merged and converted into the new format. During the planned working visit of Gusiakov to the NGDC/SEG, currently scheduled for February-March of 2004, the remaining discrepancies and uncertainties in the database content will be resolved and all records in the event and run-up tables will be provided with basic references. The master copy of the unified database will be created and maintained



Dr. Slava Gusiakov (top) peers to view the tsunami inundation model for Tsuji Valley shown by Dr. Imamura (center), while Dr. Kuniake Abe (left) and Dr. Lori Dengler look from the sides.

in the Oracle DBMS at the NGDC/SEG from where the data can be accessed via Web-based text forms and ArcIMS interactive maps as well as exported in different formats such as ASCII flat files, Excel, Access, MS SQL Server or other formats specified by the ITIC for use by the tsunami warning centers and other potential users. Additionally, recognizing the need of individual researchers to have an access to the historical data in "offline" mode, it is recommended that the offline, stand-alone application (WinHTDB graphic shell) continue to be supported and distributed using the data files retrieved from the unified tsunami database.

The second NGDC/HTDB meeting is scheduled for September 24, 2003, just before the beginning of the International Tsunami Workshop and the XIX ICG/ITSU Session, where most of the participants will again be gathered. At this time, a HTDB Regional Coordinator's meeting is planned that will provide a good opportunity for providing the coordinators with new guidelines. Additionally, a presentation of the plan will be made at the ICG/ITSU Session to inform the Member States of the GHTD development effort.

CONFERENCES

The International Workshop **TSUNAMIS IN THE SOUTH PACIFIC-- RESEARCH TOWARDS PREPAREDNESS AND MITIGATION** 25-27 September 2003

More than 50 registrations have been received for the Workshop from scientists, students and emergency managers, including representatives from Australia, Canada, France, French Polynesia, Indonesia, Japan, New Caledonia, New Zealand, Papua New Guinea, Russia and the United States of America. Registrations are still being accepted through the web site www.naturalhazards.net.nz/tsunami.

The following oral presentations and poster sessions are planned (listed in alphabetical order of presenting author, whose name appears in parenthesis)

- Significant tsunamis of Papua New Guinea and their mechanisms*
(Lawrence Anton and Chris O. McKee, Papua New Guinea)
- Submarine landslide hazards on the New Zealand continental margin*
(Geoffroy Lamarche et al. (paper given by Philip Barnes), New Zealand)
- Planning for tsunami risk in the context of other coastal hazards* (Robert G. Bell, New Zealand)
- Towards a record of paleotsunami for Northern Hawkes Bay, New Zealand*
(Ursula Cochran et al., New Zealand)
- US National Tsunami Hazard Mitigation Program: Translating scientific research into useable emergency management products* (George Crawford, USA)
- A re-evaluation of tsunami source zones affecting Australia* (Poster)
(Phil R. Cummins et al., Australia)



CONFERENCES, *continued*

- Ferdinand von Hochstetter's publications on the 1868 August 13 South American tsunami (Poster) (Leonore Hoke and Gaye Downes, New Zealand)*
- New CircumPacific Council Initiatives on tsunami mitigation and education in the Pacific Region (Robin Falconer, New Zealand)*
- Insights from underwater landslide experiments (Jason G. Fleming and Roy A. Walters, New Zealand)*
- The elusive 1826 tsunami, south Westland, New Zealand (James R. Goff et al., New Zealand)*
- US National Tsunami Hazard Mitigation Program: Inundation mapping (Frank González et al., USA)*
- US National Tsunami Hazard Mitigation Program: Operational tsunami forecasting (Frank González et al., USA)*
- Tsunami-enabling the New Zealand sea-level network (Derek G. Goring and Rob G. Bell, New Zealand)*
- Historical tsunamis in the northern and southern Pacific: A comparative study (Viacheslav K. Gusiakov, Russia)*
- Tsunami preparedness in coastal Washington, United States (David Johnston et al., New Zealand)*
- Public response to tsunami warnings: Lessons from the warning of the 1960 Chile earthquake tsunami in New Zealand coastal communities (David Johnston and Rylee Petterson, New Zealand)*
- Landslides and tsunami (Barbara H. Keating, USA)*
- Enhancements to Tsunami Warning Operations and Disaster Response in the State of Hawaii (Laura Kong et al., USA)*
- Pacific Tsunami Warning Center: New Procedures, Continuing Challenges (Charles McCreery, USA)*
- Tsunami-loss modeling (Mauri McSaveney, New Zealand)*
- Sedimentary evidence for a paleo-tsunami on the northeast coast of New Zealand (Scott L. Nichol and James R. Goff, New Zealand)*
- Tsunamigenic earthquakes in the Indonesian region (Nanang T. Puspito, Indonesia)*
- Near-field and far-field tsunamis recorded on the coast of British Columbia (Alexander B. Rabinovich et al., Russia)*
- The tsunami warning plan in French Polynesia (Dominique Reymond et al., French Polynesia)*
- Preliminary determination of focal mechanism: A project to improve tsunami warning (Dominique Reymond et al., French Polynesia)*
- Trans-Pacific tsunami propagation of the 1700 Cascadia earthquake (Kenji Satake, Japan)*
- Modelling large tsunamis generated by Cascadia subduction zone earthquakes (Poster) (Josef T. Cherniawsky et al., (paper given by Fred E. Stephenson), USA)*
- Submarine landslides: Model development and Kaikoura study (Roy A. Walters, New Zealand)*
- Revision of the Tsunami Support Plan for the Republic of Fiji (Lazarusa Vuetibau et al., Fiji)*
- Tsunami resonance: Toward a warning system and hazard evaluation (Roy A. Walters et al., New Zealand)*

TSUNAMI WARNING SYSTEM RESPONSES TO AN M8.5 CHILEAN EARTHQUAKE:

A Panel roundtable discussion between the Tsunami Warning Centers, State Emergency Officials, and Researchers, with questions from the floor. Convenors: Laura Kong, ITIC Director and Hawaii State Tsunami Advisor, and Gaye Downes, Institute of Geological & Nuclear Sciences.

The goal of the session is to provide emergency managers and scientists with a better understanding of the tsunami warning system, and to dialogue in a realistic, but 'non-emergency' situation, on their expectations with respect to tsunami warnings. Following the themes of the workshop, the session will review tsunami observation, analysis, and warning message protocols used in operations internationally and nationally by warning centers and local emergency management to prepare their communities and to mitigate against tsunami disasters.

A panel comprised of tsunami warning center representatives, government tsunami advisors and scientists, and emergency managers will discuss procedural responses and evaluation methods for a hypothetical earthquake that could generate a potentially-destructive, Pacific-wide tsunami. An earthquake scenario and

CONFERENCES, *continued*

tsunami propagation timeline with pertinent observations will be generated, and each panelist will represent his/her agency.

The exercise will cover the responses and analyses as carried out by the warning centers, including their timelines of response, the methods used for rapid seismic evaluation, the issuance of tsunami watch and warning messages, confirmation of the tsunami using sea level data and scientific constraints on tsunami generation, propagation, and impact, and finally the criteria necessary for cancellation of the warning. Their responses will be integrated throughout with the reactions of emergency management agencies and the typical questions they pose as they interact with the warning centers to first decide what response is appropriate and whether to call for the evacuation of all low-lying areas, and afterward, when the 'all clear' should be declared to permit the public to return to heretofore unsafe areas.

It is hoped that this dialogue will result in clearer communications between the warning centers and emergency officials, a clearer understanding of the present limitations of tsunami science, more knowledgeable decisions on the part of the emergency community, and equally importantly, the identification of better or more useful products by the warning centers for its customers.

Confirmed panelists will include Dr. Chip McCreery, PTWC, Geophysicist-in-Charge, Dr. Dominique Reymond, Centre Polynésien de Prévention des Tsunamis (CPPT) Director, Mr. Emilio Lorca, Sistema Nacional De Alerta De Maremotos Head (SNAM, Chile), and Mr. Noritake Nishide, Japan Meteorological Agency (JMA) Earthquake and Tsunami Observation Division Director; Emergency Management officials and tsunami advisors from Australia (Dr. Linda Anderson-Berry), the USA (Mr. George Crawford, Washington, Dr. Laura Kong, Hawaii) and New Zealand (Mr. Mike O'Leary, Dr. Willem de Lange); and Dr. Frank Gonzalez from NOAA/PMEL, who has led a team involved in applied research efforts to improve warning operations and develop inundation models for evacuation map development in the USA.

ITSU-XIX 29 SEPTEMBER - 3 OCTOBER, WELLINGTON, NEW ZEALAND

The Nineteenth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific (ITSU-XIX) is organised by the Intergovernmental Oceanographic Committee of UNESCO for the signatory countries involved in the Pacific Tsunami Warning System. It will follow the IUGG/ITSU Workshop. A schedule, agenda, and provisional list of documents are available at the ITSU website at <http://ioc.unesco.org/itsu>. This is a closed session addressing the governance and operation of the Warning System, however, it is possible for observers to attend. Arrangements to observe can be arranged through Sara Williams at MCDDEM (E-mail: sara.williams@dia.govt.nz). All inquiries regarding ITSU/XIX should be addressed to Mr. Peter Pissierssens, Head, Ocean Services, IOC (E-mail: p.pissierssens@unesco.org).

Located in Honolulu, the International Tsunami Information Center (ITIC) was established on November 12, 1965, by the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific, and Cultural Organization (UNESCO). In 1968, the IOC formed the International Coordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU).

The present 25 Member States are: Australia, Canada, Chile, China, Colombia, the Cook Islands, Costa Rica, the Democratic People's Republic of Korea, Ecuador, Fiji, France, Guatemala, Indonesia, Japan, Mexico, New Zealand, Nicaragua, Peru, Philippines, the Republic of Korea, Samoa, Singapore, Thailand, the Russian Federation, and the United States of America.

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